SIN 517

Issue 4

November 2024

Suppliers' Information Note

For The Openreach Network

Single Order Generic Ethernet Access (SOGEA) over VDSL2 and G.fast

Service & Interface Description

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1. Service Outline

1.1 General

The information contained in this SIN relates to the launch of SOGEA and the associated changes to engineering policy and practice.

It should be noted that the information contained within this SIN might be subject to change. Please check with the https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do site to ensure you have the latest version of this document.

Single Order GEA (SOGEA) is a data-only NGA fibre to the cabinet product that is self-contained, hides complexity by including the copper bearer, and can be conveniently purchased through a single order.

SOGEA:

- is an addition to the Openreach product portfolio;
- uses the same Ethernet characteristics as currently available from GEA-FTTC products;
- is supplied with its own copper bearer that would terminate in the DSLAM/exchange and not with MPF or WLR equipment;
- is available as a new provide or migration from/to existing products or product combinations;
- accommodates the industry geographic number port process in the order and provision process;
- requires any voice service to be provided entirely by a service provider (e.g. a VoIP service)
- is delivered using VDSL2 or G.fast technology

SOGEA is generally expected to be a self-install (PCP-only) provision with CPE Enablement (i.e. CP provided modem/router with either an optional internal or an external ATA). If voice reinjection is required, then an NTE5C with a SOGEA VoIP faceplate must be fitted.

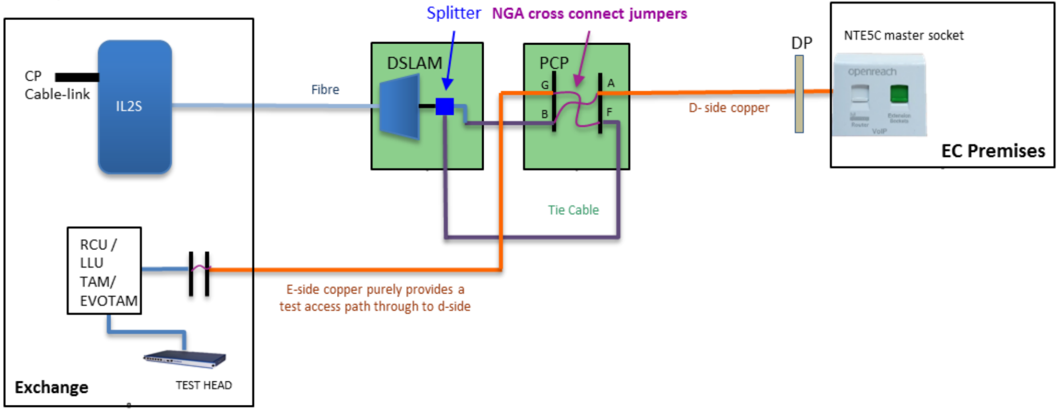
The service will not be supported if an Openreach modem is connected in the customer premise. Appointed install options will also be available, including installation of NTE5C and faceplate where required, but will require a CP modem-router.

This SIN refers extensively to Openreach SIN498 (GEA-FTTC Service and Interface Specification) [1] and SIN527 (Generic Ethernet Access G.fast (GEA-G.fast) Service and Interface Description)[4].

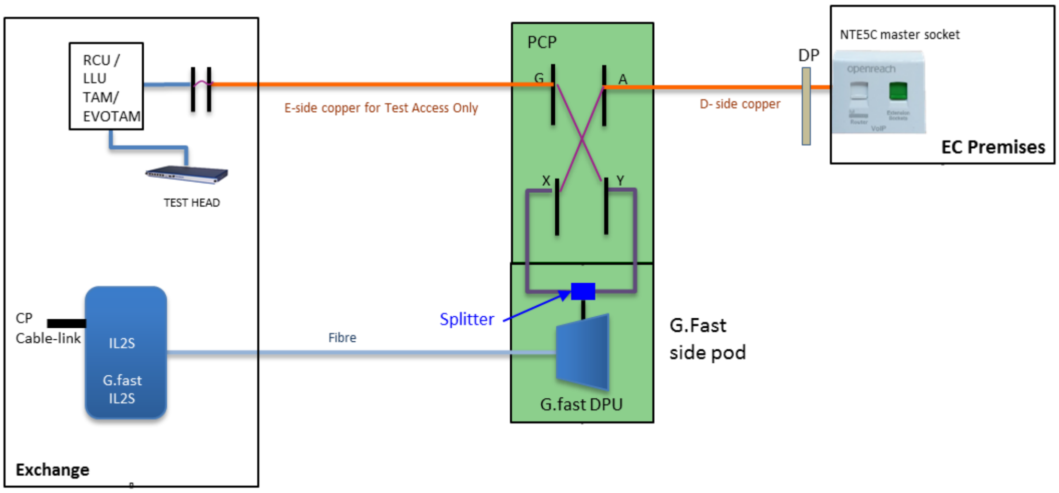
1.2 SOGEA Network Architecture

The following diagrams show a typical Openreach deployment of SOGEA up to the NTE. This relies on exchange based copper test access.

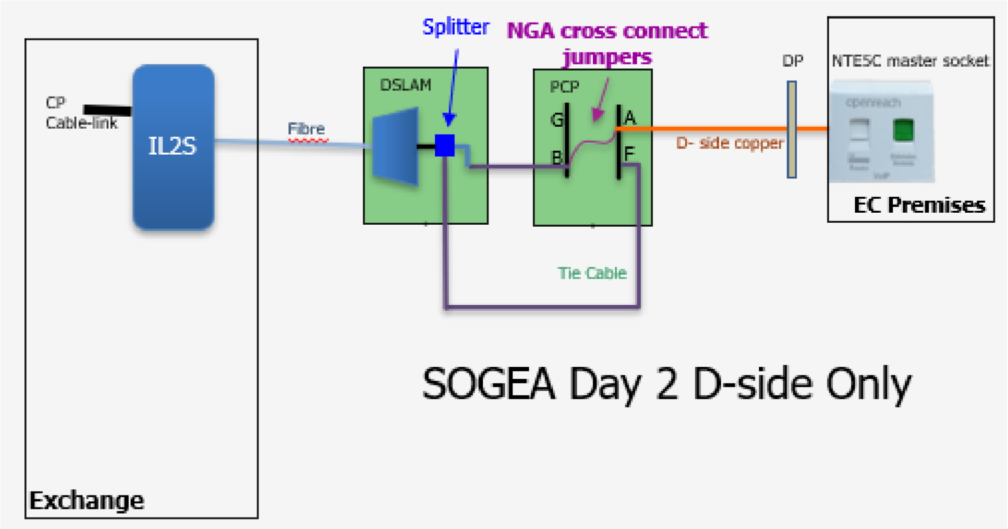
- DAY1 SOGEA (VDSL)


Splitter
NGA cross connect jumpers
CP
Cable-link
IL2S
Fibre
DSLAM
PCP
G
B
A
F
DP
NTE5C master socket
openreach
EC Premises
D- side copper
Tie Cable
RCU /
LLU
TAM/
EVOTAM
E-side copper purely provides a test access path through to d-side
TEST HEAD
Exchange

- DAY1 SOGEA (G.fast)


RCU /
LLU
TAM/
EVOTAM
TEST HEAD
E-side copper for Test Access Only
PCP
G
A
X
Y
DP
D- side copper
NTE5C master socket
openreach
EC Premises
CP
Cable-link
IL2S
G.fast
IL2S
Fibre
Splitter
G.Fast
side pod
G.fast DPU
Exchange

In the case of D-side Only SOGEA the only difference for both VDSL and Gfast is the loss of the Copper E-side Requirement. D-side Only SOGEA DOES NOT rely on exchange based copper test access, instead testing from the DSLAM is enabled and engineers are issued an extra testing item named a Far End Device which acts as a portable Test Head.


Splitter
NGA cross connect
jumpers
CP
Cable-link
IL2S
Fibre
DSLAM
PCP
G
B
A
F
DP
NTE5C master socket
openreach
D- side copper
EC Premises
Tie Cable
SOGEA Day 2 D-side Only
Exchange

Please note the type of NTE and faceplate may vary (see later). Working service will also require a CP's own modem-router, not shown here.

1.3 The copper pair associated to a SOGEA service

The copper D-side pair forms part of the working circuit that runs the SOGEA service.

For Day1 product launch, the copper E-side will provide the connectivity back to the exchange for copper test access where needed. Openreach will test the whole circuit from the test head in the exchange to the NTE.

The SOGEA copper pair will have the same specification as detailed in SIN-349 Section 3 entitled 'MPF Specification'.

SIN-349 Section 5 entitled 'MPF Section 5 MPF Path Facility Operation' also applies to SOGEA where the service is 'out of sync', and on appointed provision and repair, where a PQT test is run on the full copper circuit.

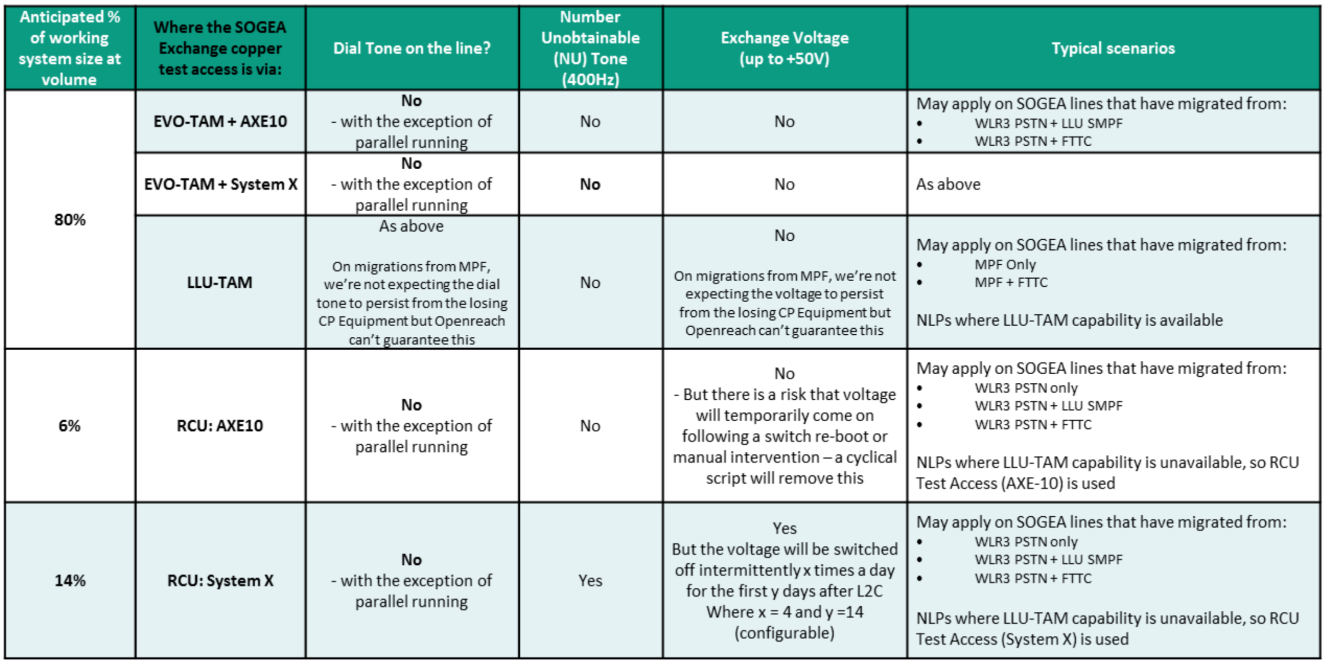
For D-Side Only SOGEA (historically known as Day 2 SOGEA) Openreach will test the whole circuit from the DSLAM in the street to the NTE, but will otherwise align to the same SIN-349 standards quoted above.

Any DC voltage from the exchange is covered in the next section.

1.4 Conditions on the line from the copper exchange

With the exception of a temporary parallel running period, there is no **dial tone** from the exchange on SOGEA lines. A temporary parallel running period can only apply to a migration from a working WLR3-PSTN/LLU-MPF service to SOGEA

Any other conditions from the exchange will depend upon the test access solution, tabled as follows:



Anticipated % of working system size at volume	Where the SOGEA Exchange copper test access is via:	Dial Tone on the line?	Number Unobtainable (NU) Tone (400Hz)	Exchange Voltage (up to +50V)	Typical scenarios
80%	**EVO-TAM + AXE10**	**No** - with the exception of parallel running	No	No	May apply on SOGEA lines that have migrated from: • WLR3 PSTN + LLU SMPF • WLR3 PSTN + FTTC
	EVO-TAM + System X	**No** - with the exception of parallel running	**No**	No	As above
	LLU-TAM	As above On migrations from MPF, we're not expecting the dial tone to persist from the losing CP Equipment but Openreach can't guarantee this	No	No On migrations from MPF, we're not expecting the voltage to persist from the losing CP Equipment but Openreach can't guarantee this	May apply on SOGEA lines that have migrated from: • MPF Only • MPF + FTTC NLPs where LLU-TAM capability is available
6%	**RCU: AXE10**	**No** - with the exception of parallel running	No	No - But there is a risk that voltage will temporarily come on following a switch re-boot or manual intervention – a cyclical script will remove this	May apply on SOGEA lines that have migrated from: • WLR3 PSTN only • WLR3 PSTN + LLU SMPF • WLR3 PSTN + FTTC NLPs where LLU-TAM capability is unavailable, so RCU Test Access (AXE-10) is used
14%	**RCU: System X**	**No** - with the exception of parallel running	Yes	Yes But the voltage will be switched off intermittently x times a day for the first y days after L2C Where x = 4 and y =14 (configurable)	May apply on SOGEA lines that have migrated from: • WLR3 PSTN only • WLR3 PSTN + LLU SMPF • WLR3 PSTN + FTTC NLPs where LLU-TAM capability is unavailable, so RCU Test Access (System X) is used

For D-Side Only SOGEA (historically known as Day 2 SOGEA) there will be no copper exchange conditions on the line as service and test functionality will be from the DSLAM in the street.

1.5 The GEA Service Test and raising a trouble report

The GEA Service Test sources multiple parameters and assesses them in real time to determine if there is an anomaly on the service.

Common symptoms of a trouble report, as experienced by customers, are slow speed and modem retrains. However, identical symptoms can also appear intermittently when there is Internet congestion or if the Internet applications require more stability than the current DLM policy provides.

Hence many reports of speed or line stability issues are not actually faults but temporary issues which naturally occur on a contended DSL network.

The GEA Service Test will diagnose a service as faulty if the service test algorithms identify a problem that is most likely to be occurring on the Openreach network. This will allow a GEA1 fault to be accepted by Openreach. If the test can't diagnose a fault, it may be that DLM has managed the line speed down to achieve the required stability, this is not a fault.

Please note current speed, speed relative to previous speeds, and speed relative to eMLC estimates can be impacted by many conditions and it is not a reliable guide that the symptoms are likely to be capable of resolution within the Openreach domain.

1.6 Test OK

Where the GEA Service Test indicates a potential problem with the line, as in the situations described above, the CP can raise a GEA1 fault.

However, in the event that the GEA Service Test returns a PASS result (MFL = OK), but you would still like us to investigate a particular issue on the line; you may raise a GEA3 Visit Assure trouble report. A Visit Assure enables you to appoint an engineer visit to the customer premises to perform further diagnostic activities on the line.

1.7 Recommendations for IP or ATA voice services

SOGEA is a broadband only data product from Openreach. For CPs who choose to host over-IP or ATA based over-the-top voice services, Openreach recommends:

- A choice of 'Stable' DLM policy which has the lowest tolerance to errors and retrains;
- avoiding CPE self re-boots on a regular basis;
- a voice codec with a high tolerance of packet loss.
- setting voice packet priority according to 2.1.5

2. SOGEA over VDSL2 Interface Descriptions

This section defines the interface descriptions for SOGEA over VDSL2.

2.1 GEA Cablelink

2.1.1 Physical connection

Requirements as defined in SIN498.

2.1.2 Ethernet Frame Size

Requirements as defined in SIN498.

2.1.3 VLAN Tagging Options at the GEA Cablelink for SOGEA

2.1.3.1 Openreach Added Tags

Requirements as defined in SIN498.

2.1.3.2 CP Added Tags

Requirements as defined in SIN498.

2.1.4 Ethertype

Requirements as defined in SIN498.

2.1.5 Downstream Priority Marking

As SIN498 but with the following additional strong recommendation:

The CP should mark downstream voice traffic with PCP code marking 4. This will ensure that, at the VDSL2 port on the street DSLAM, the downstream voice frames are given strict priority over multi-cast packets and other Internet data sent with priority markings of 0 to 3. CPs are also advised to consider that voice frames marked at priority 4 are treated identically to other Internet data sent as priority 4 at the VDSL2 port and the relative rates may have a bearing on the quality of voice services delivered.

2.1.5.1 Per EU / Intra EU frame drop prioritisation

As SIN498 but with the following additional strong recommendation:

In order to ensure that voice frames receive prioritised rate marking, CPs should ensure that frames with PCP code markings of 1 to 4 do not exceed the VDSL2 line rate or the prioritised rate, whichever is lower.

2.1.6 Downstream Shaping

Requirements as defined in SIN498.

2.1.7 Intermediate Agent / DHCP Relay Agent

Requirements as defined in SIN498.

2.1.7.1 Inverted DHCP/PPPoE

Requirements as defined in SIN498.

2.1.8 Ethernet OAM

Requirements as defined in SIN498.

2.1.9 Transparency

Requirements as defined in SIN498.

2.1.10 Frame Duplication

Requirements as defined in SIN498.

2.2 User Network Interface – General

2.2.1 VDSL2 Rates

Requirements as defined in SIN498

2.2.2 Dynamic Line Management

Requirements as defined in SIN498.

2.2.3 Upstream Shaping

Requirements as defined in SIN498.

2.2.4 Upstream Priority Marking

The following requirement supersedes the corresponding section in SIN498:

The SOGEA service will NOT be supported over an Openreach provided modem.

Furthermore, the GEA service does not recognise PCP priority code markings upstream. Therefore the CP should ensure that their CPE gives strict priority to upstream voice frames.

Any VLAN tags added to upstream packets shall be treated as payload by the SOGEA service.

2.2.5 Modem UNI Port Loopback Testing

Requirements as defined in SIN498.

2.3 Openreach Provided Modem Product Variant

Not Applicable to SOGEA.

2.4 CP Provided Modem Product Variant

Requirements as defined in SIN498.

Note that support of analogue telephony devices over SOGEA will require a CP's ATA to be provided with the modem/router, so that analogue telephony devices can be plugged directly into the ATA. In cases where additional devices on home extension wiring need to be fed by the ATA, a special cable is needed to connect the ATA to the voice re-injection socket on the NTE5C SOGEA faceplate (see section 4.4.1). This SOGEA faceplate isolates the voice reinjection voltage from the Openreach network and is required to give reliable service from the ATA on analogue devices.

If the customer does not intend to use their extension wiring, then there is no requirement for voice reinjection and hence no need for an SOGEA VoIP faceplate but a standard VDSL2/G.Fast SSFP (service Specific Face Plate) is still recommended where home wiring is present.

Non-isolated voice reinjection must not be applied to the Openreach network. This can cause damage to the Openreach network and may put the service at risk of degradation and failure. This is a specific violation of the SOGEA/SOG.Fast terms and conditions.

2.4.1 Physical Network Termination

Openreach provides a metallic line with a line-box known as a Network Terminating Equipment (NTE). The physical interface is a standard telephone socket on the line box as described in SIN-351 [2] or an RJ45 socket or both, depending on the type of front plate installed.

2.4.1.1 Examples of NTEs

In the cases where the 'NTE details' have been recorded in inventory by way of a prior engineering visit, it is possible for the following 'NTE Types' to be presented to the CP via the MLPA and eMLC dialogue services, for a working/stopped line.

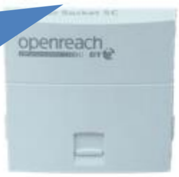
Please note that only an NTE5A or NTE5C should be used with SOGEA.

			Compatible Technologies (can be affected by choice of faceplate)					**Faceplate options**				
Type	**Description**	**Key features**	**VDSL: SOGEA /FTTC**	**Gfast: SOGfast /FTTC**	**ADSL: LLU**	**POTS: WLR3 /LLU**	**SOGEA/SOGfast Compatibility Requirements**	**CCU**	**VDSL / ADSL / SDSL**	**Gfast**	**1B VoIP**	**Secure**
NTE5C	Network Termination Equipment 5C	• Latest NTE with clip on/off faceplates, where the faceplate can be changed without the aid of a screwdriver. • No trailing wires when the faceplate is removed (with the exception of a broadband extension kit).	Y	Y	Y	Y	• Requires a 1B VoIP faceplate to support voice reinjection on extension wiring on SOGEA/SOGfast • Else modem lead plugs into the modem socket on an SSFP or into a microfilter socket if a CCU is present. • An Openreach SOGEA Engineer would replace a CCU with SSFP(VDSL)/Gfast/1B VoIP faceplate as required • 'Secure' faceplate is not compatible with SOGEA.	**Y**	**Y**	**Y**	**Y**	**Y**
NTE5B	Network Termination Equipment 5B	• This option is essentially the legacy 'Secure' version of the NTE5A. • It always has a blank faceplate, meaning no sockets for a modem or phone jack. Typically used for payphones or at secure locations.	N	N	N	Y	• Not compatible with SOGEA/SOGfast. • Should be replaced with an NTE5C and an appropriate faceplate for SOGEA/SOGfast	N	N	N	N	**Y**
NTE5A	Network Termination Equipment 5A	• Legacy NTE where faceplates are fitted with the aid of a screwdriver. • End Customer wiring terminates on the faceplate, hence potential for trailing wires when the faceplate is removed. Not as user friendly.	Y	Y Microfilter recomm-ended for GEA-FTTC Gfast	Y	Y	Cannot support VRI - Should be replaced with an NTE5C and an isolation faceplate in this case. Can support SOGfast but not compatible with extensions). Compatible with SOGEA (VDSL) provided: • modem is plugged into CCU via a microfilter and there is no home wiring or • Modem is plugged into modem port on the SSFP faceplate.	**Y**	**Y**	N	N	N
NTTP	Network Test and Termination Point (Krone Strip)	• A multi-block terminal demarcation point in the absence of an NTE5. • Typically used to terminate multiple MPF lines at a business premises, from which the business would connect their own telephone system e.g. PBX. • No way of plugging-in a modem	N	N	N	Y	• Not compatible with SOGEA/SOGfast. • Should be replaced with an NTE5C and an appropriate faceplate for SOGEA/SOGfast	N/A				
PLUG IN NTE	Purely a test point, where a pair of wires terminate on a krone strip.	• Provides a Master socket signature for testing to the Openreach demarcation point, before other CP wiring or customer's own system is installed.	N	N	N	Y						
EXTERNAL NTE	Network Termination Equipment that's designed to be fitted outside of the premises.	• Will always require an extension socket inside of the premises. • The yellow plug when removed will disconnect the customer's service and the extension wiring.	N	N	Y	Y						
LINE TERMINATION MODULE (FROM EXTERNAL NTE)	The internal Network Termination Equipment that would be connected to an External NTE	• Provides a socket inside of the premises for plugging in CPE.	N	N	N	Y						

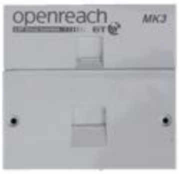
2.4.1.2 Examples of compatible faceplates:

Compatible only by way of a microfilter/ converter. To convert the phone jack socket into an RJ45 socket

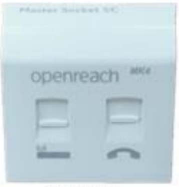
ard



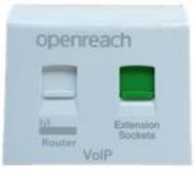
NTE5C with standard CCU front plate



NTE5A with interstitial SSFP (Service Specific Front Plate)



NTE5C with SSFP



SOGEA VRI Isolation Front plate

The RJ45 socket will present the DSL signal on pins 4 and 5. Looking into the socket from the front – with the key at the bottom – Pin 1 is on the left and Pin 8 is on the right.

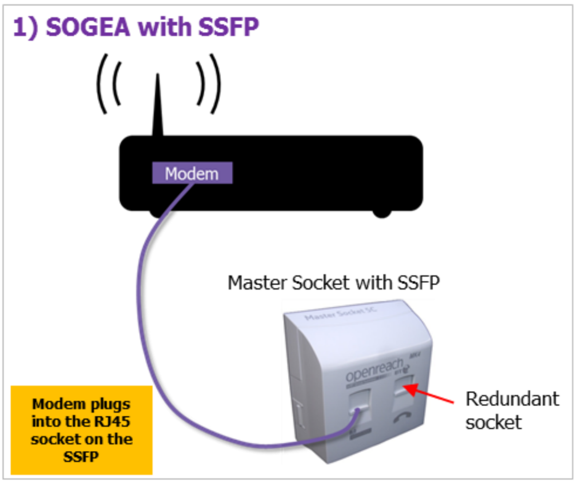
The following table explains what the type of signals that the faceplate blocks or passes through. It also shows the how the Service Test Dialogue Service and Line Test Dialogue Service will report the faceplate, if its signature is detected. Note that the SOGEA VoIP faceplates are the only faceplates that come with a signature for detection.

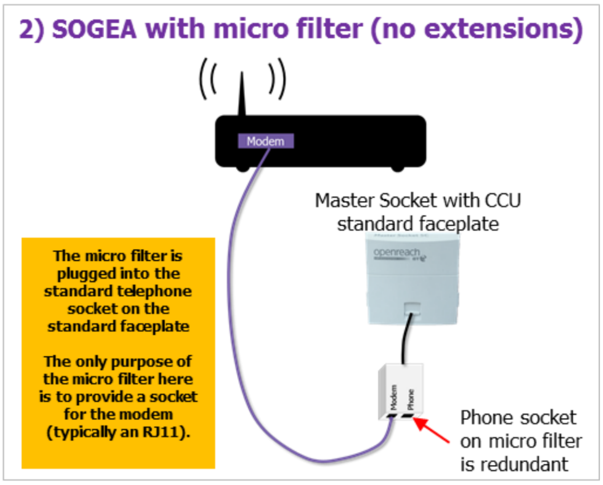
Faceplate	At the NTE socket	enables on an extension(s):	prohibits on an extension(s):	prohibits on the Openreach Network:	STDS 'Faceplate' value	eMLC 'NTE faceplate detection' value	Action for WLR3-PSTN / LLU-MPF
VoIP faceplate 1b	Broadband and exchange narrowband (if present) available at 'Router' socket. Neither are available at extension socket. Only VRI signals injected via the green socket are present on extension wiring	enables extensions for an ATA derived VRI service	Blocks narrowband from the exchange (e.g. WLR3-PSTN / LLU-MPF) and broadband from reaching extensions (e.g. ADSL, VDSL, G.fast)	Blocks VRI from coming back onto the Openreach external network, if correct cable is used	**Detected SOGEA Physical Isolator**	**P**	To change this faceplate to a Standard CCU or SSFP for compatibility with WLR3-PSTN / LLU-MPF
Standard CCU	Enables everything & blocks nothing	Anything	Nothing (allows all services through)	Nothing (allows all services through)	**Not Detected** *(can't detect this faceplate)*	**N** *(can't detect this faceplate)*	N/A – Compatible with WLR3-PSTN / LLU-MPF
VDSL/ADSL/SDSL (SSFP)	Enables broadband and narrowband left socket only and narrowband on the right. Analogue POTs equipment should only be used from the right socket or from extensions	enables extensions for exchange narrowband se -rvices (e.g. WLR)	Blocks any broadband service from reaching extensions (avoids Bridge Taps but the Hub must be plugged into master socket)	Nothing (allows all services through but broadband must be from the modem socket only and narrowband from the phone socket or extensions)	**Not Detected** *(can't detect this faceplate)*	**N** *(can't detect this faceplate)*	N/A – Compatible with WLR3-PSTN / LLU-MPF

2.4.1.3 Typical deployment scenarios without the use of extensions:

2.4.1.3.1 SOGEA without voice over IP (hence no requirement for an ATA (Analogue Telephone Adapter):

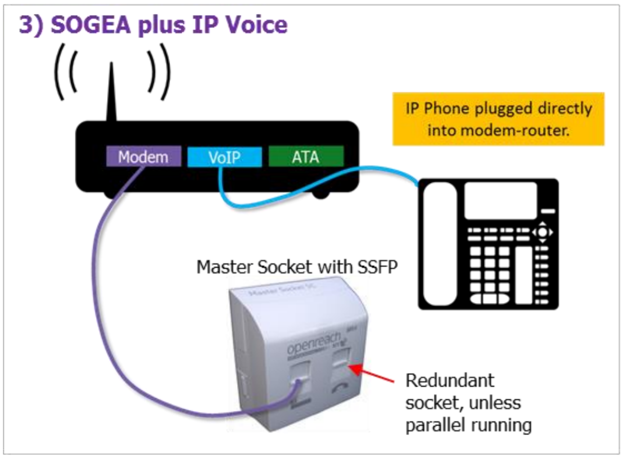
Here are two deployment examples, where the customer is using SOGEA without voice over IP (nor ATA voice service over the top of the SOGEA broadband service).

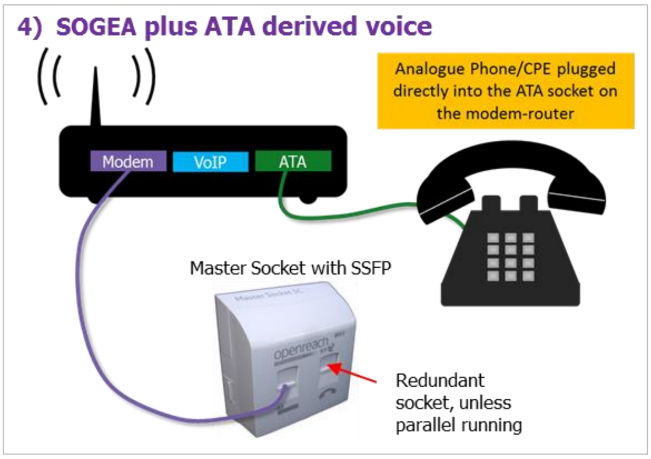

1) SOGEA with SSFP
Modem
Master Socket with SSFP
Redundant socket
Modem plugs into the RJ45 socket on the SSFP


2) SOGEA with micro filter (no extensions)
Modem
Master Socket with CCU standard faceplate
The micro filter is plugged into the standard telephone socket on the standard faceplate
The only purpose of the micro filter here is to provide a socket for the modem (typically an RJ11).
Modem
Phone
Phone socket on micro filter is redundant

2.4.1.3.2 SOGEA with IP/ATA voice ‘over the top’ VoIP

Here are two more deployment examples (*again without the use of extensions*), where the CP has chosen to host over IP or ATA voice service ‘over the top’ of the SOGEA broadband service.


3) SOGEA plus IP Voice
IP Phone plugged directly into modem-router.
Modem
VoIP
ATA
Master Socket with SSFP
openreach
Redundant socket, unless parallel running


4) SOGEA plus ATA derived voice
Analogue Phone/CPE plugged directly into the ATA socket on the modem-router
Modem
VoIP
ATA
Master Socket with SSFP
openreach
Redundant socket, unless parallel running

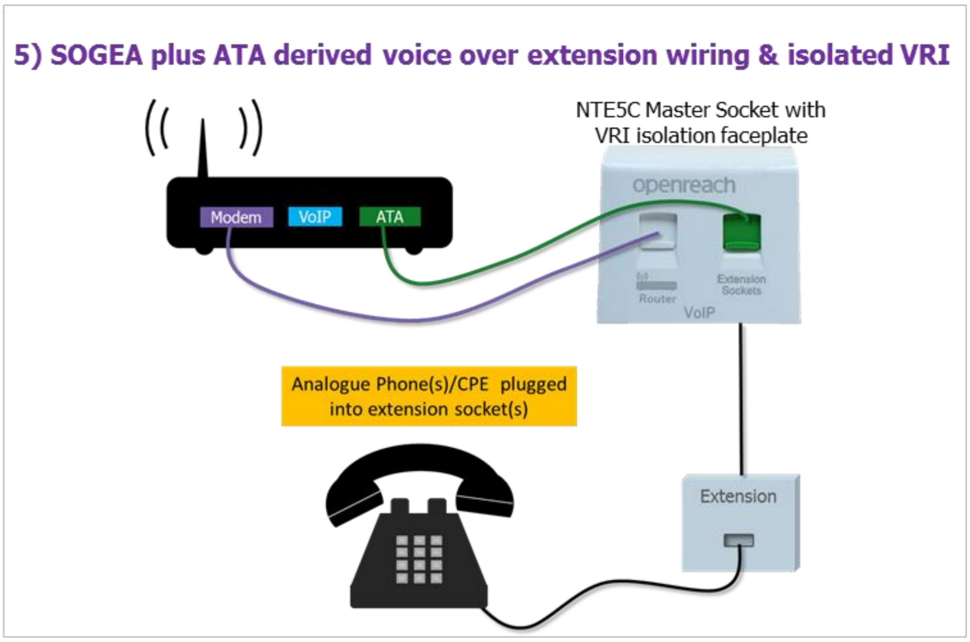
2.4.1.4 Typical deployment scenarios with the use of extensions (Voice Re-Injection):

Where the CP has identified that voice reinjection around a customer’s existing home wiring is required, the customer’s NTE must be fitted with a VoIP faceplate to avoid harm to the Openreach network and Customer Experience issues. A SOGEA/SOG.Fast VoIP faceplate can only be fitted to the new style NTE5C Master Socket back plate.

SOGEA provisions are available as either a managed install or customer self-install order type. Customer premises that do not have a NTE5C will need their existing NTE to be replaced with a NTE5C. This can only be done by an Openreach engineer or a qualified CP engineer (subject to commercial agreement between Openreach and the CP).

Where the NTE5C is pre-installed there is no imposed restriction on who can change the faceplate, this can be done using the clip on/off design without the aid of a screwdriver, for those willing and able.

The SOGEA/SOG.Fast VoIP faceplate will work with both SOGEA (VDSL2) or SOG.Fast (G.fast)


5) SOGEA plus ATA derived voice over extension wiring & isolated VRI
NTE5C Master Socket with VRI isolation faceplate
Modem
VoIP
ATA
openreach
Router
Extension Sockets
VoIP
Analogue Phone(s)/CPE plugged into extension socket(s)
Extension

The SOGEA/SOG.Fast VoIP faceplates function as follows:

- Isolates home wiring from both broadband and exchange voice and requires a modem directly connected to the NTE5C faceplate
- CP provided ATA cable is plugged into the green socket labelled ‘Extension Sockets’

SOGEA/SOG.Fast VoIP faceplate sockets are as follows:

‘Router’ socket accepts RJ45 or RJ11 plugs and is identical to standard Service Specific Front Plates (SSFP) with the DSL active pair on RJ45 pins 4 and 5. The modem must be plugged in here. Alternatively on the rear of the front plate is a tool-less connector that can be used as a data extension if that is preferred.

Extension Sockets

‘Extension Sockets’ only supports VRI (never exchange based analogue voice). The socket is a Modified Modular Jack (6 pins with an offset retaining clip) with pins 2 & 5 supporting VRI. Bell-wire ringing regeneration is included to support the 3-wire ringing function on home extensions as required by some CPE.

The plug on the cable shown in green in Figure 1 (connecting the ‘Extension Sockets’ with the ATA) will need to meet the following requirements:

- •Modified Modular Jack (DEC style) which is similar to an RJ11 but the retaining clip if off-set to one side
- •There is no published standard to reference but the Openreach vendor will produce the socket on the faceplate to be compatible with at least the following MMJ plug suppliers:
  - –Stewart Connector – Bel Group 940-SP-3066R-OST
  - –L-com 6x6 MMJ part TSP3066-MMJ

Modified Modular Jack with offset tang

With either plate fitted there is no requirement for traditional micro-filters to be used on extensions

Pre-existing type of NTE & Faceplate (before SOGEA Provision)	Any home wiring extensions?	Is VRI needed	Minimum to achieve best performance for SOGEA	Ideal
NTE5A/C with standard CCU faceplate and micro filter	no	no	No change	NTE5C with SSFP
	yes	no	Upgrade to NTE5C with SSFP	← use this
	yes	yes	Upgrade to NTE5C with VoIP faceplate	← use this
NTE5A with SSFP	no	no	No change	NTE5C with SSFP
	yes	no	No change	NTE5C with SSFP
	yes	yes	Upgrade to NTE5C with VoIP faceplate	← use this

2.4.2 UninhabitablePhysical Realisation

Where a SOGEA service is installed in street furniture or end-customer cabinets then NTE5C with SSFP will be installed where there is physical space. Where the NTE5C with SSFP is too large for the enclosure then an NTE5C without the SSFP will be installed. In this circumstance the customer equipment will need to connect to the NTE5C test socket using BT431A connector type.

3. CPE Requirements for SOGEA over VDSL2

Requirements as defined in SIN498.

3.1 Scope

Requirements as defined in SIN498.

3.2 Requirements

Requirements as defined in SIN498.

3.2.1 Physical Connection

Requirements for VDSL2 modem as defined in SIN498. The ATA will require a BT plug to enable it to be connected to the POTS port on the faceplate.

3.2.2 VDSL2 Physical Layer

Requirements as defined in SIN498.

3.2.3 Ethernet Layer

Requirements as defined in SIN498.

3.2.4 WAN VLAN Layer

Requirements as defined in SIN498.

3.2.5 Ethernet OAM

Requirements as defined in SIN498.

3.2.6 CPE VDSL2 Filter Requirements

3.2.6.1 Centralised CPE VDSL2 filter device requirements

Not applicable to SOGEA

3.2.6.2 Distributed CPE VDSL2 Filter Requirements

Requirements as defined in SIN498.

3.2.6.3 Additional Notes About CPE Filters

Requirements as defined in SIN498.

3.2.7 Supplementary Information

Requirements as defined in SIN498.

3.2.8 Analogue Telephony Adaptor

If the CP's equipment contains an ATA and there is any intention or likelihood to connect the ATA to the home wiring to drive additional telephony devices, a SOGEA VoIP faceplate must be fitted as defined in section 2.4.1. This is in order to prevent unexpected and potentially harmful voltages from being passed from the ATA/home wiring to the Openreach network. Openreach is concerned that floating voltages or voltages positive with respect to earth may have a harmful effect on its network.

If the ATA/home wiring is not isolated by use of one of the SOGEA faceplates, problems may occur that prevent the ATA from functioning correctly e.g. off/on–hook detection.

Openreach may deploy test mechanisms to detect and report the use of non-isolated ATA equipment – refer to the SOGEA contract for further information.

3.2.9 SOGEA/SOG.Fast Faceplate

SOGEA/SOG.Fast faceplates may contain passive electrical signatures that will allow Openreach to determine which type of faceplate is attached to the circuit. These circuits do not change the electrical properties of the line as defined in SIN349 [3].

CPs should note that the SOGEA VoIP faceplate must be removed and replaced with an appropriate alternative if the service is changed to include standard WLR or MPF. With the SOGEA switched faceplate the is the option to switch into the mode suitable for exchange based voice, and note the telephone will need to be plugged into an extension socket.

NOTE: The NTE5C back-plate contains the standard termination/ringing components across the A/B pair of a 470k Ohm resistor in series with a 1.8µF capacitor, with the bellwire ringing signal being generated at the union between the resistor and capacitor.

4. SOGEA over G.fast Interface Descriptions

This section defines the interface descriptions for SOGEA over G.fast.

4.1 GEA Cablelink

4.1.1 Physical connection

Requirements as defined in SIN527.

4.1.2 Ethernet Frame Size

Requirements as defined in SIN527.

4.1.3 VLAN Tagging Options at the GEA Cablelink for SOGEA over G.Fast

4.1.3.1 Openreach Added Tags

Requirements as defined in SIN527.

4.1.3.2 CP Added Tags

Requirements as defined in SIN527.

4.1.4 Ethertype

Requirements as defined in SIN527.

4.1.5 Downstream Priority Marking

As SIN527 but with the following additional strong recommendation:

The CP should mark downstream voice traffic with PCP code marking 4. This will ensure that, at the G.fast port on the street DSLAM, the downstream voice frames are given strict priority over multi-cast packets and other Internet data sent with priority markings of 0 to 3. CPs are also advised to consider that voice frames marked at priority 4 are treated at the G.fast port identically to other Internet data sent as priority 4, and the relative rates may have a bearing on the quality of voice services delivered.

4.1.5.1 Per EU / Intra EU frame drop prioritisation

As SIN527 but with the following additional strong recommendation:

In order to ensure that voice frames receive prioritised rate marking, CPs should ensure that frames with PCP code markings of 1 to 4 do not exceed the G.fast line rate or the prioritised rate, whichever is lower.

4.1.6 Downstream Shaping

Requirements as defined in SIN527.

4.1.7 Intermediate Agent / DHCP Relay Agent

Requirements as defined in SIN527.

4.1.7.1 Inverted DHCP/PPPoE

Requirements as defined in SIN527.

4.1.8 Ethernet OAM

Requirements as defined in SIN527. Check variable request/response.

4.1.9 Transparency

Requirements as defined in SIN527.

4.1.10 Frame Duplication

Requirements as defined in SIN527.

4.2 User Network Interface – General

4.2.1 G.fast Rates

Requirements as defined in SIN527

4.2.2 Dynamic Line Management

Requirements as defined in SIN527.

4.2.3 Upstream Shaping

Requirements as defined in SIN527.

4.2.4 Upstream Priority Marking

The following requirement supersedes the corresponding section in SIN527:

The SOG.Fast service will NOT be supported over an Openreach provided modem. Furthermore, the GEA service does not recognise PCP priority code markings upstream. Therefore the CP should ensure that their CPE gives strict priority to upstream voice frames.

Any VLAN tags added to upstream packets shall be treated as payload by the SOG.Fast service.

4.2.5 Modem UNI Port Loopback Testing

Requirements as defined in SIN527.

4.3 Openreach Provided Modem Product Variant

As per SIN527. CP needs to provide a suitable router/hub.

4.4 CP Provided Modem Product Variant

Requirements as defined in SIN527.

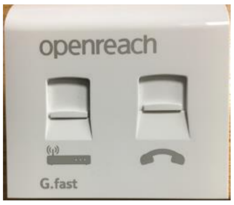
Note that support of analogue telephony devices over SOG.Fast will require either an internal or an external ATA to be included with the modem/router so that the analogue telephony devices can be plugged directly into the ATA. In cases where additional devices on home extension wiring need to be fed by the ATA, a special interface cable is needed to connect the ATA to the voice re-injection socket on the NTE5C VoIPfaceplate will be required. This faceplate isolates the voice reinjection from the Openreach network and is required to give reliable analogue voice service from the ATA.

4.4.1 Physical Network Termination

Requirements as defined under this same topic in the VDSL2 section, with the following exceptions:

4.4.1.1 Examples of compatible faceplates:

The same examples apply, with the exception of the 'NTE5C with SSFP' that in case of SOG.Fast/FTTC(G.fast) looks like this:



4.4.1.2 Configurations of NTE and faceplates to support SOG.Fast

Pre-existing type of NTE & Faceplate (before SOG.Fast Provision)	Any home wiring extensions?	Is VRI needed	Minimum to achieve best performance	Ideal
NTE5A/C with standard CCU faceplate and micro filter	no	no	Upgrade to G.fast micro filter	Upgrade to NTE5C with G.fast SSFP
	yes	no	Upgrade to NTE5C with G.fast SSFP	← use this
	yes	yes	Upgrade to NTE5C with VoIP front plate	← use this
NTE5A with SSFP	no	No	Upgrade to NTE5C with G.fast SSFP	← use this
	yes	No	Upgrade to NTE5C with G.fast SSFP	← use this
	yes	Yes	Upgrade to NTE5C with VoIP front plate	← use this

4.4.2 Uninhabitable Physical Realisation

Where a SOGEA service is installed in street furniture or end-customer cabinets then NTE5C with SSFP will be installed where there is physical space. Where the NTE5C with SSFP is too large for the enclosure then an NTE5C without the SSFP will be installed. In this circumstance the customer equipment will need to connect to the NTE5C test socket using BT431A connector type.

5. CPE Requirements for SOGEA over G.fast

Requirements as defined in SIN527.

5.1 Scope

Requirements as defined in SIN527.

5.2 Requirements

Requirements as defined in SIN527.

5.2.1 Physical Connection

Requirements for G.fast modem as defined in SIN527.

5.2.2 G.fast Physical Layer

Requirements as defined in SIN527.

5.2.3 Ethernet Layer

Requirements as defined in SIN527.

5.2.4 WAN VLAN Layer

Requirements as defined in SIN527.

5.2.5 Ethernet OAM Check variable request/response

Requirements as defined in SIN527.

5.2.6 CPE G.fast Filter Requirements

5.2.6.1 Centralised CPE G.fast filter device requirements

Requirements as defined in SIN527.

5.2.6.2 Distributed CPE G.fast Filter Requirements

Requirements as defined in SIN527.

5.2.6.3 Additional Notes About CPE Filters

Requirements as defined in SIN527.

5.2.7 Supplementary Information

Requirements as defined in SIN527.

5.2.8 Analogue Telephony Adaptor

If the CP equipment contains an ATA and there is any intention or likelihood to connect the ATA to the home wiring to drive additional telephony devices, a VoIP faceplate must be fitted as defined in section 4.4.1. This is in order to prevent unexpected and potentially harmful voltages from being passed from the ATA/home wiring to the Openreach network. Openreach is concerned that floating voltages or voltages positive with respect to earth may have a harmful effect on its network.

If the ATA/home wiring is not isolated by use of one of the VoIP faceplates, problems may occur that prevent the ATA from functioning correctly e.g. off/on–hook detection.

Openreach may deploy test mechanisms to detect and report the use of non-isolated ATA equipment – refer to the SOG.Fast contract for further information.

5.2.9 SOGEA/SOG.Fast VoIP Faceplate

SOGEA/SOG.Fast VoIP faceplates contain a passive electrical signature that will allow Openreach to determine that this type of faceplate is attached to the circuit. These circuits do not change the electrical properties of the line as defined in SIN349 [3].

CPs should note that the SOGEA/SOG.Fast VoIP faceplate must be removed and replaced with an appropriate alternative if the service is changed to include standard WLR or MPF.

NOTE: The NTE5C back plate contains the standard termination/ringing components across the A/B pair of a 470k Ohm resistor in series with a 1.8µF capacitor, with the bellwire ringing signal being generated at the union between the resistor and capacitor.

6. References

[1]	SIN498	Generic Ethernet Access Fibre to the Cabinet (GEA-FTTC) Service and Interface Description
[2]	SIN351	BT Public Switched Telephone Network (PSTN): Technical Characteristics Of The Single Analogue Line Interface
[3]	SIN349	BT Metallic Path Facility, Interface Description
[4]	SIN527	Generic Ethernet Access G.fast (GEA-G.fast) Service and Interface Description

For information on where to obtain these referenced documents, please see the document sources list at https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do

7. Abbreviations

ATA	Analogue Telephony Adaptor
AELEM	Alternate Electrical Length Estimation Methodology
ANFP	Access Network Frequency Plan
CCU	Customer Connection Unit

CP	Communication provider
CPE	Customer Premise Equipment
CVLAN	Customer VLAN
DLM	Dynamic Line Management
eMLC	Manage Line Characteristics (a Dialogue Service for pre-order enquires)
MFL	Main Fault Location
MPF	Metallic Path Facility
PCP	Primary Cross-connect Point (aka cabinet)
PCP	Priority Code Point aka 802.1p priority
POTS	Plain Old Telephony Service
PSTN	Public Switched Telephony Network
QLN	Quiet Line Noise
SIN	Suppliers' Information Note (BT Publication)
SOGEA	Single Order Generic Ethernet Access
SOG.Fast	SOGEA over G.fast
SSFP	Service Specific Face Plate
SIN	Suppliers' Information Note (BT Publication)
UPBO	Upstream Power Back-off
VLAN	Virtual Local Area Network
VDSL2	Very high Speed Digital Subscriber Line (Second generation)
VoIP	Voice Over Internet Protocol
WLR	Wholesale Line Rental

8. History PLEASE UPDATE FROM V2.0

Issue	Date	Changes
Issue 1	March 2020	First version of SIN
Issue 3	30/11/2020	Updated following change to Openreach template
Issue 3	02/11/2021	Annual Review – no changes required – issue remains unchanged.
Issue 3	01/11/2022	Annual Review – branding and font changes only – issue remains unchanged.
Issue 4	29/11/2023	Added further detail to D-side only

Annex A Test Requirements for SOGEA Over VDSL2

This Annex provides a detailed breakdown of the modem conformance tests (MCT) requirements to enable a piece of vendor CPE to be validated against the CPE Requirements defined in Section 3 of this document. This is largely based on the requirements of SIN498 [1] with any specific requirements for SOGEA shown in the relevant sub-sections.

A.1 Test Configuration

Requirements as defined in SIN498.

All physical layer tests should be performed with the CPE modem connected to a SOGEA isolating faceplate fitted to an NTE5C unless otherwise stated.

A.1.1 Band Profiles

Requirements as defined in SIN498.

A.1.2 Loops

Requirements as defined in SIN498.

A.1.3 Plain Old Telephony Service (POTS)

Not required for SOGEA

A.1.4 Crosstalk

Requirements as defined in SIN498.

A.2 Network Equipment

Requirements as defined in SIN498.

A.3 Test Equipment

Requirements as defined in SIN498.

A.3.1 Details of Impedance Matching Network

Requirements as defined in SIN498.

A.4 Modem Conformance test (MCT) Requirements for SOGEA

Requirements as defined in SIN498.

A.4.1 Initial Gating Tests

Requirements as defined in SIN498.

A.4.1.1 Synchronisation

Requirements as defined in SIN498.

A.4.1.2 Network Interference

Requirements as defined in SIN498.

A.4.2 Modem Conformance Tests

See Section 3 for details of the specific requirements to which these conformance tests refer.

A.4.2.1 Physical Layer Tests

Each of the followings Sections defines the test required to demonstrate compliance to a particular requirement of STIN517. The requirement number is shown in brackets after the title of the test.

A.4.2.2 Physical Connection (R.PHY.1)

Requirements as defined in SIN498.

A.4.2.3 VDSL2 Layer

A.4.2.3.1 Support of Mandatory Requirements of G.993.2 (R.VDSL2.1)

Requirements as defined in SIN498.

A.4.2.3.2 Support of Profile 17A and 998ADE17 Band Plan (R.VDSL2.2 and R.VDSL2.5)

Requirements as defined in SIN498.

A.4.2.3.3 Compliance with BT ANFP Part C (R.VDSL2.4)

Requirements as defined in SIN498.

A.4.2.3.4 Support of Cabinet Based VDSL2 Operation (R.VDSL2.6)

Requirements as defined in SIN498.

A.4.2.3.5 Support of UPBO (R.VDSL2.7)

Requirements as defined in SIN498.

A.4.2.3.6 Support of U0 Band (R.VDSL2.8)

Requirements as defined in SIN498.

A.4.2.3.7 Support of Seamless Rate Adaptation (R.VDSL2.9)

Requirements as defined in SIN498.

A.4.2.3.8 Support of Downstream Retransmission (R.VDSL2.10)

Requirements as defined in SIN498.

A.4.2.3.9 Support of Upstream Retransmission (R.VDSL2.11) – Optional

Requirements as defined in SIN498.

A.4.2.3.10 Support of Vectoring (R.VDSL2.12)

Requirements as defined in SIN498.

A.4.2.3.11 Support of AELEM (R.VDSL2.13)

Requirements as defined in SIN498.

A.4.2.3.12 Support of Bit Swap (R.VDSL2.15)

Requirements as defined in SIN498.

A.4.2.3.13 Correct Reporting of Vendor Information (R.VDSL2.16)

Requirements as defined in SIN498.

A.4.2.3.14 Correct reporting of Key Test and Diagnostic Parameters

Requirements as defined in SIN498.

A.4.2.3.15 Verification of Hlog and QLN

Requirements as defined in SIN498.

A.4.2.4 Ethernet Layer

A.4.2.4.1 Ethernet Frame Size (R.ETH.1)

Requirements as defined in SIN498.

A.4.2.5 WAN/VLAN Layer

A.4.2.5.1 Support of IEEE 802.1Q VLAN Encapsulation (R.WAN.1)

Requirements as defined in SIN498.

A.4.2.5.2 Ingress Frames Encapsulated Within IEEE 802.1Q VLAN (R.WAN.2)

Requirements as defined in SIN498.

A.4.2.5.3 Simultaneous Support of Multicast and Unicast over the same VLAN (R.WAN.3)

Requirements as defined in SIN498.

A.4.2.5.4 Ethertype Field of Ethernet Frame Set to 0x8100 on Ingress to Openreach UNI (R.WAN.4)

Requirements as defined in SIN498.

A.4.2.5.5 CVLAN Canonical Format Indicator Set to 0 on Ingress to Openreach UNI (R.WAN.5)

Requirements as defined in SIN498.

A.4.2.5.6 VLAN ID Set to 101 (R.WAN.6)

Requirements as defined in SIN498.

A.4.2.5.7 IGMP Reports Encoded Correctly (R.WAN.7)

Requirements as defined in SIN498.

A.4.2.5.8 Multicast Frames Detected and Processed Correctly (R.WAN.9)

Requirements as defined in SIN498.

A.4.2.6 OAM Layer

A.4.2.6.1 Support of Loop Back Messages (R.OAM.2)

Requirements as defined in SIN498.

A.4.2.6.2 Support of 802.3AH Loopback (R.OAM.3)

Requirements as defined in SIN498.

A.4.2.6.3 Support of 'Dying Gasp' (R.OAM.4)

Requirements as defined in SIN498.

A.4.2.6.4 Correct Reporting of Key test and Diagnostic Parameters (R.VDSL2.17)

Requirements as defined in SIN498.

A.4.2.7 CPE Filters

R.FILTER.1 Centralised Splitters

Not Applicable to SOGEA

R.FILTER.2 Distributed Splitters (i.e. micro-filters)

Requirements as defined in SIN498.

A.4.3 SOGEA Testing

A.4.3.1 Transmission Performance Testing

In addition to the tests defined above, the transmission performance of the CPE will also need to be measured against the current Live GEA reference models. This will involve the modem performance being evaluated with the DSLAM configured to implement both fast and retransmission profiles.

A.4.3.1.1 Deployment Scenario 1 - CPE plugged directly into NTE5C

Description – This test gives an indication of how a SOGEA CPE would perform if connected to the Openreach GEA network as part of a SSFP based deployment scenario (i.e. no home wiring). It is also used to record a bench-mark of the CPE modem's performance against the current (i.e. LIVE) network firmware which can then be used to check whether the transmission performance of the CPE modem is adversely affected by future network upgrades. Testing should be performed using both FAST and RETRANSMISSION operation.

Test Description (FAST) –

1. Configure DSLAM to implement an ESEL value of 30dB and the default band profile (O2_0_6_36_1_6_18_1).
2. Connect CPE to DSLAM using the test setup shown in Figure 2.
3. Set line simulator to a loop length of 200m with the appropriate crosstalk injected at each end of the system.
4. Record time taken for the CPE to attained synchronisation. This shall be <90s on all loops regardless of line length.
5. Wait 2 minutes for system to stabilise then record key transmission performance parameters (data rate, margin etc.) from EMS.
6. Repeat steps 3 to 5 for 500m, 1000m, 1500m, 2000m and 2200m cable lengths.
7. Repeat for ESEL values of 10 and 50dB.
8. Repeat for all current combinations of Openreach DSLAMs and line cards.

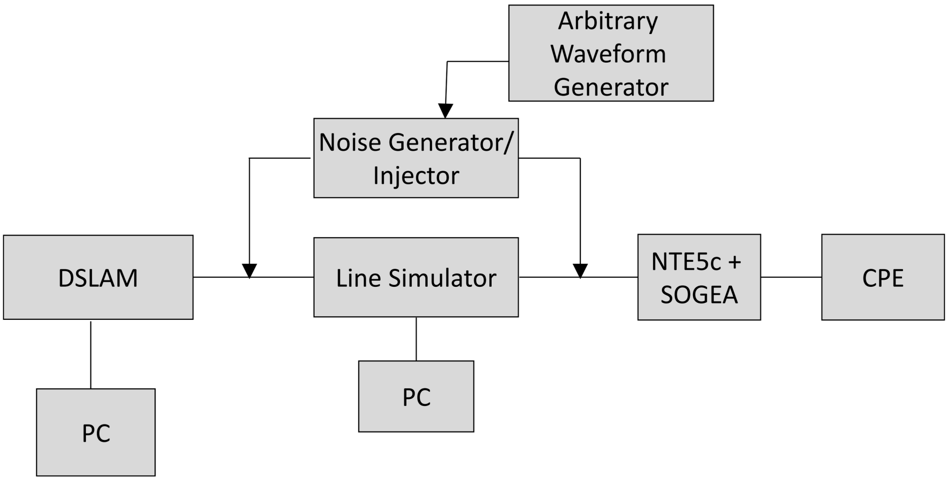


Figure 2 : Test Configuration for Measuring Transmission Performance (CPE plugged directly into NTE5C)

Test Description (RETRANSMISSION) –

As for FAST operation but using the appropriate open retransmission profile (O2_3_6_36_3_6_18_3)for each loop length and ESEL.

ESEL values	Lengths
10 dB, 30 dB, 50 dB	200m, 500m, 1000m, 1500m, 2000m, 2200m

Table 1 : ESEL Values and Loop Lengths for Retransmission Testing

Expected Outcome – This test will provide an indication on how the SOGEA CPE performs when connected to the current Openreach GEA network for both fast and interleaved operation.

A.4.3.1.2 Deployment Scenario 2 : CPE plugged directly into wired extension

Description – This test gives an indication of how a SOGEA CPE would perform if connected to the Openreach GEA network as part of a deployment scenario using microfilters and home wiring). Comparing the results against those obtained from an SSFP based deployment scenario (i.e. no home wiring) will give an indication on how the CPE performance is affected by bridged taps caused by telephony extensions in the customer's premises. In this configuration, the three lengths of cable (7m, 12m and 20m) connected to the NTE5 (the demarcation point in the customer's premises where the Openreach network terminates) are representative of telephony wiring extensions and are specifically chosen to introduce notches in the VDSL downstream and upstream frequency bands. Testing should be performed using both FAST and RETRANSMISSION operation.

Test Description (FAST) –

1. Configure DSLAM to implement an ESEL value of 30dB and the default band profile (O2_0_6_36_1_6_18_1).
2. Connect CPE to DSLAM using the test setup shown in Figure 3.
3. Set line simulator to a loop length of 200m with the appropriate crosstalk injected at each end of the system
4. Record time taken for the CPE to attained synchronisation. This shall be <90s on all loops regardless of line length.
5. Wait 2 minutes for system to stabilise then record key transmission performance parameters (data rate, margin etc.) from EMS.
6. Repeat steps 3 to 5 for 500m, 1000m, 1500m, 2000m and 2200m cable lengths.
7. Repeat for ESEL values of 10 and 50dB.
8. Repeat for all current combinations of Openreach DSLAM and line cards.
9. Compare results against those obtained for a for the deployment scenario with the SOGEA modem plugged directly into the NTE5c to determine impact of telephony extension wiring on CPE modem performance.

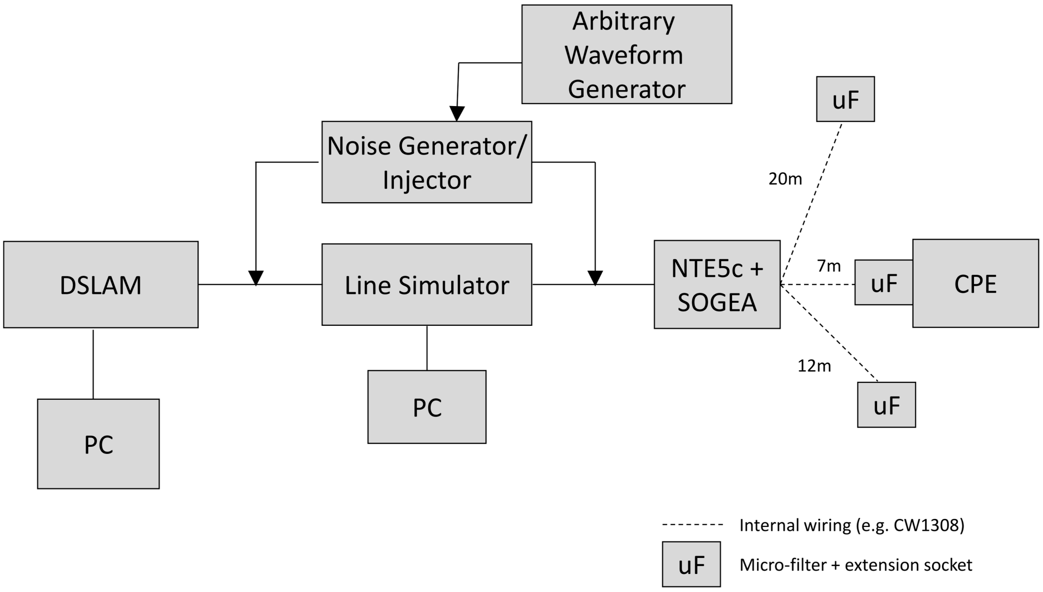

Arbitrary Waveform Generator
Noise Generator/ Injector
DSLAM
Line Simulator
NTE5c + SOGEA
PC
PC
uF
20m
7m
uF
CPE
12m
uF
Internal wiring (e.g. CW1308)
uF
Micro-filter + extension socket

Figure 3 : Test Configuration for Measuring Transmission Performance (CPE plugged directly into wired extension)

Test Description (RETRANSMISSION) –

As for FAST operation but using the open retransmission profile O2_3_6_36_3_6_18_3.

Expected Outcome – This test will provide an indication on how the SOGEA CPE performs when connected to the current Openreach GEA network for both fast and retransmission operation.

A.4.3.2 Verification of 'Router Only' Functionality

Requirements as defined in SIN498.

Annex B Test Requirements for SOGEA Over ADSL2

Not Applicable for SOGEA

Annex C Test Requirements for SOGEA Over G.fast (SOG.Fast)

This Annex provides a detailed breakdown of the modem conformance tests (MCT) requirements to enable a piece of vendor CPE to be validated against the CPE Requirements defined in Section 5 of this document. This is largely based on the requirements of SIN527 [4] with any specific requirements for SOG.Fast shown in the relevant sub-sections.

C.1 Test Configuration

Requirements as defined in SIN527.

All physical layer tests should be performed with the CPE modem connected to a SOG.Fast isolating faceplate fitted to an NTE5C unless otherwise stated.

C.1.1 Band Profile

Requirements as defined in SIN527.

C.1.2 Loops

Requirements as defined in SIN527.

C.1.3 Plain Old Telephony Service (POTS)

Not Required for SOG.Fast

C.1.4 Crosstalk

Requirements as defined in SIN527.

C.2 Network Equipment

Requirements as defined in SIN527.

C.3 Test Equipment

Requirements as defined in SIN257.

C.3.1 Details of Impedance Matching Network

Requirement as defined in SIN 527.

C.4 Modem Conformance test (MCT) Requirements for SOG.Fast

Requirements as defined in SIN527.

C.4.1 Initial Gating Tests

Requirements as defined in SIN527.

C.4.1.1 Synchronisation

Requirements as defined in SIN527.

C.4.1.2 Network Interference

Requirements as defined in SIN527

C.4.2 Modem Conformance Tests

See Section 5 for details of the specific requirements to which these conformance tests refer.

C.4.2.1 Physical Layer Tests

Each of the following Sections defines the test required to demonstrate compliance to a particular requirement of SIN517. The requirement number is shown in brackets after the title of the test.

C.4.2.2 Physical Connection (R.PHY.1)

Requirements as defined in SIN527.

C.4.2.3 G.fast Layer

C.4.2.3.1 Support of Mandatory Requirements of G.9700 and G.9701 (R.FAST.1)

Requirements as defined in SIN527.

C.4.2.3.2 Support of Profile 106a and Profile 106b (R.FAST.3)

Requirements as defined in SIN527.

C.4.2.3.3 Compliance with BT ANFP Part F (R.FAST.4)

Requirements as defined in SIN527.

C.4.2.3.4 Support of Cabinet Based Cabinet Based G.fast Operation (R.FAST.5)

Requirements as defined in SIN527.

C.4.2.3.5 Support of UPBO (R.FAST.4 and R.FAST.25)

Requirements as defined in SIN527.

C.4.2.3.6 Support of Spectral Compatibility with VDSL2 services (R.FAST.6)

Requirements as defined in SIN527.

C.4.2.3.7 Support of Seamless Rate Adaption (R.FAST.10)

Requirements as defined in SIN527.

C.4.2.3.8 Support of Downstream and Upstream Retransmission (R.FAST.8)

Requirements as defined in SIN527.

C.4.2.3.9 Support of Vectoring (R.FAST.9)

Requirements as defined in SIN527.

C.4.2.3.10 Support of Fast Rate Adaption (R.FAST.11)

Requirements as defined in SIN527.

C.4.2.3.11 Support of Bit Swap (R.FAST.27)

Requirements as defined in SIN527.

C.4.2.3.12 Correct reporting of Vendor Information (R.FAST.21)

Requirements as defined in SIN527.

C.4.2.3.13 Support of RFI and IAR notching (R.FAST.24)

Requirements as defined in SIN527.

C.4.2.3.14 Verification of Hlog and QLN

Requirements as defined in SIN527.

C.4.2.4 Ethernet Layer

C.4.2.4.1 Ethernet Frame Size (R.ETH.1)

Requirements as defined in SIN527.

C.4.2.5 WAN/VLAN Layer

C.4.2.5.1 Ingress Frames Encapsulated Within IEEE.802.1Q VLAN (R.WAN.2)

Requirements as defined in SIN527.

C.4.2.5.2 Simultaneous Support of Multicast and Unicast over the same VLAN (R.WAN.3)

Requirements as defined in SIN527.

C.4.2.5.3 Ethertype Field of Ethernet Frame Set to 0x8100 on Ingress to Openreach UNI (R.WAN.4)

Requirements as defined in SIN527.

C.4.2.5.4 CVLAN Canonical Format Indicator Set to 0 on Ingress to Openreach UNI (R.WAN.5)

Requirements as defined in SIN527.

C.4.2.5.5 VLAN ID Set to 101 (R.WAN.6)

Requirements as defined in SIN527.

C.4.2.5.6 IGMP Reports Encoded Correctly (R.WAN.7)

Requirements as defined in SIN527.

C.4.2.5.7 Multicast Frames Detected and Processed Correctly (R.WAN.8)

Requirements as defined in SIN527.

C.4.2.6 OAM Layer

C.4.2.6.1 Support of ‘Dying Gasp’ (R.OAM.1)

Requirements as defined in SIN527.

C.4.2.6.2 Support of 'Passive Mode' (R.OAM.2)
Requirements as defined in SIN527.

C.4.2.6.3 Support of 802.3AH Loopback (R.OAM.3)
Requirements as defined in SIN527.

C.4.2.6.4 Support of Loop Back Messages (R.OAM.8)
Requirements as defined in SIN527.

C.4.2.7 CPE Filters

R.FILTER.1 Centralised Splitters
Not Applicable to SOG.Fast

R.FILTER.2 Distributed Splitters (i.e. micro-filters)
Not Applicable to SOG.Fast

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